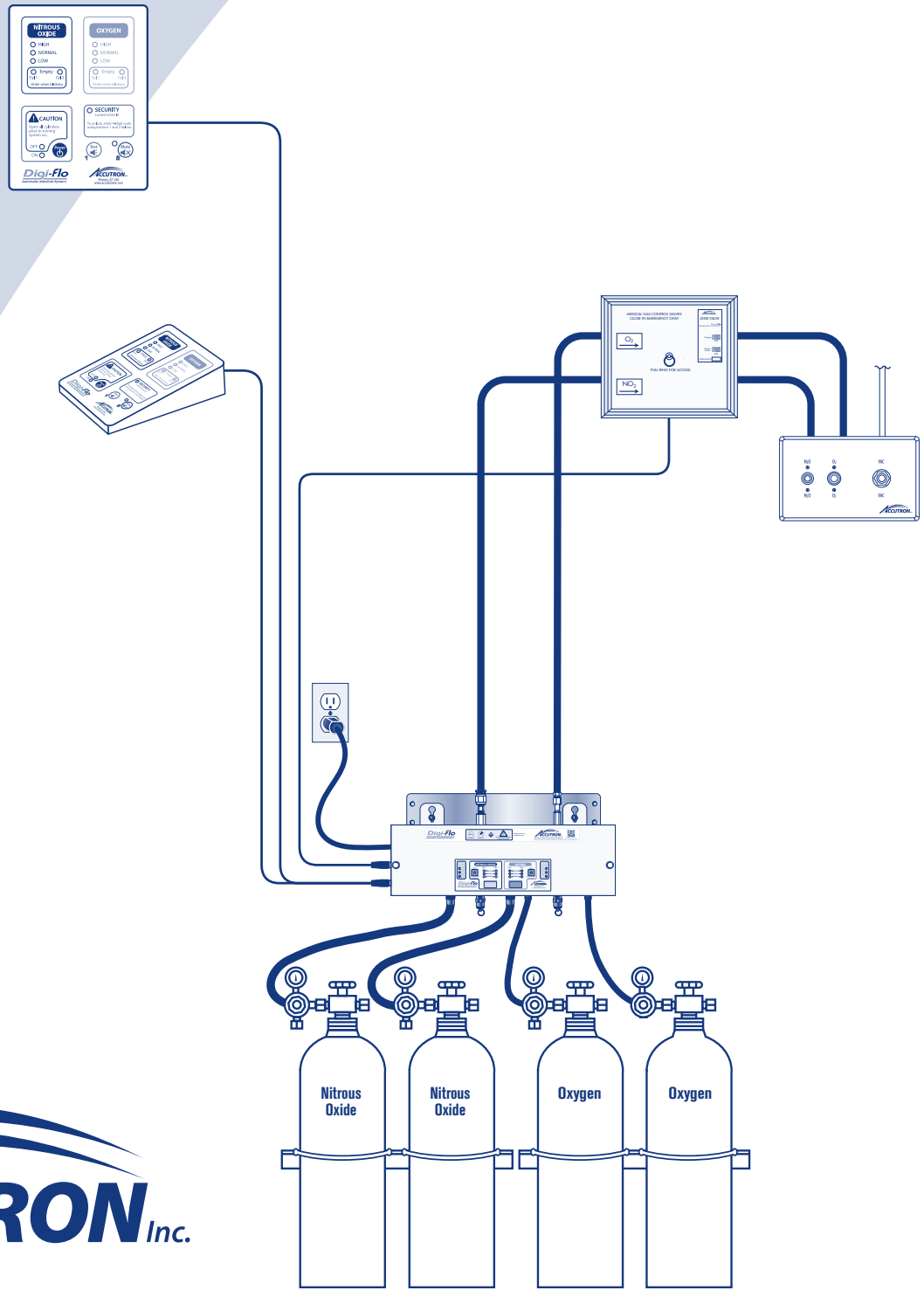
Digi-Flo™ Automatic Switching Manifold/Alarm System

User Manual



ACCUTRON Inc.

PACKAGE CONTENTS

Pre-Installation Kit:
- Mounting plate with risers
- 100' Cat 6, Alarm Cable
- Alarm Rough-in box
- Pre-Install Instructions

Main Manifold with Cover
Office Control Panel (Wall or Desk)
4 Pressure Regulators (2 N_2O and 2 O_2)
4 Regulator Hoses (2 N_2O and 2 O_2
1 Set Cylinder Restraints
Power Cord Installation
Instructions User Manual
Installation Screws
Warranty Card

SPECIFICATIONS

Temperature Range	-7 °C to 54 °C (19 °F to 130 °F)
Rated O_2 Flow	High flow operation in cold or humid climates may require external regulator heaters.
Rated N_2O Flow	Minimum 100 LPM at 50 psi when connected to an appropriate gas cylinder and regulator.
High Pressure Alarm	60 psi
Low Pressure Alarm	40 psi

Warning: *Disconnect from main power is accomplished by unplugging the power cord from the manifold. If conduit adapter box is installed, disconnect is achieved by moving rocker switch to the "OFF" position.*

Please remember to complete and return the warranty card to Accutron.
It is located within this manual.
Thank you.

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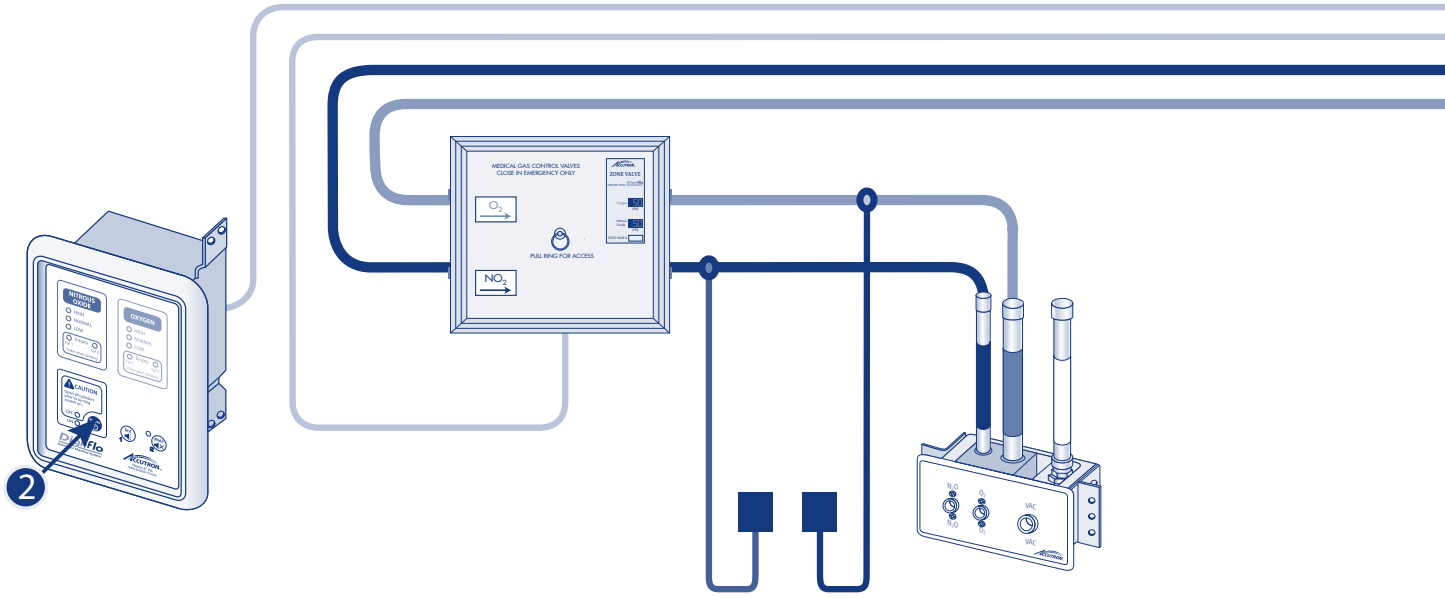
If assistance is needed during installation, please contact the Accutron dealer from whom the equipment was purchased or call Accutron Customer Service at 800-531-2221

I. START-UP INSTRUCTIONS



GETTING STARTED

ON

1. **OPEN ALL CYLINDER VALVES IN THE CYLINDER STORAGE ROOM. (OPEN VALVES BEFORE YOU PUSH THE "POWER" BUTTON ON THE ALARM PANEL).**
2. **PUSH THE "POWER" BUTTON ON THE ALARM PANEL.**
   ** If this is a security version, you will be prompted to enter the security code. (Refer to: II, 2, A)*

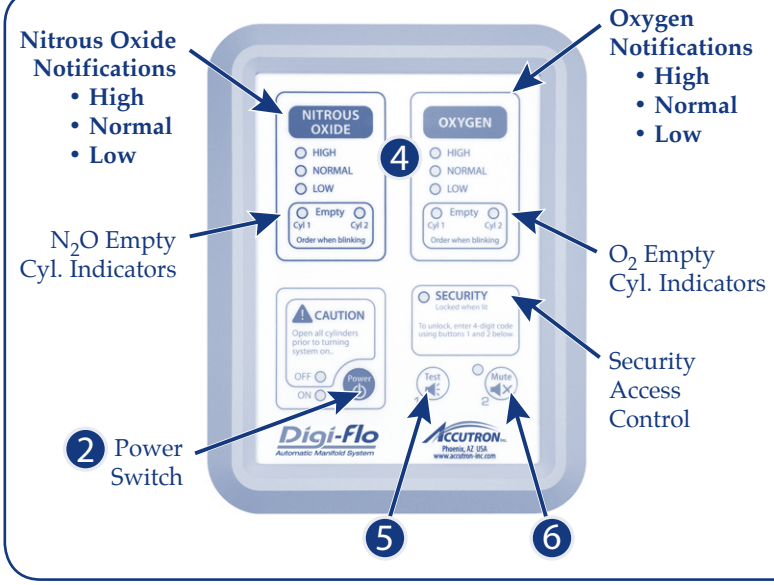
OFF

2. **PUSH THE "POWER" BUTTON ON THE ALARM PANEL.**
1. **CLOSE CYLINDER VALVES.**

Enjoy your easy-to-use and trouble-free cylinder management system.

AT THE ALARM PANEL

1. Open all Cylinders connected to the manifold by turning them counter-clockwise. Pressure should come up on each of the regulator gauges.
2. Go to the main Alarm Panel inside the office and turn on the system.
   - If needed, refer to the System Operation Instructions below.
3. The system should now be in operation.
4. At the Alarm Panel:
   - Each Gas Notification should indicate "Normal."
   - The Power On Light should turn to green.



SECURITY SYSTEM OPERATION:

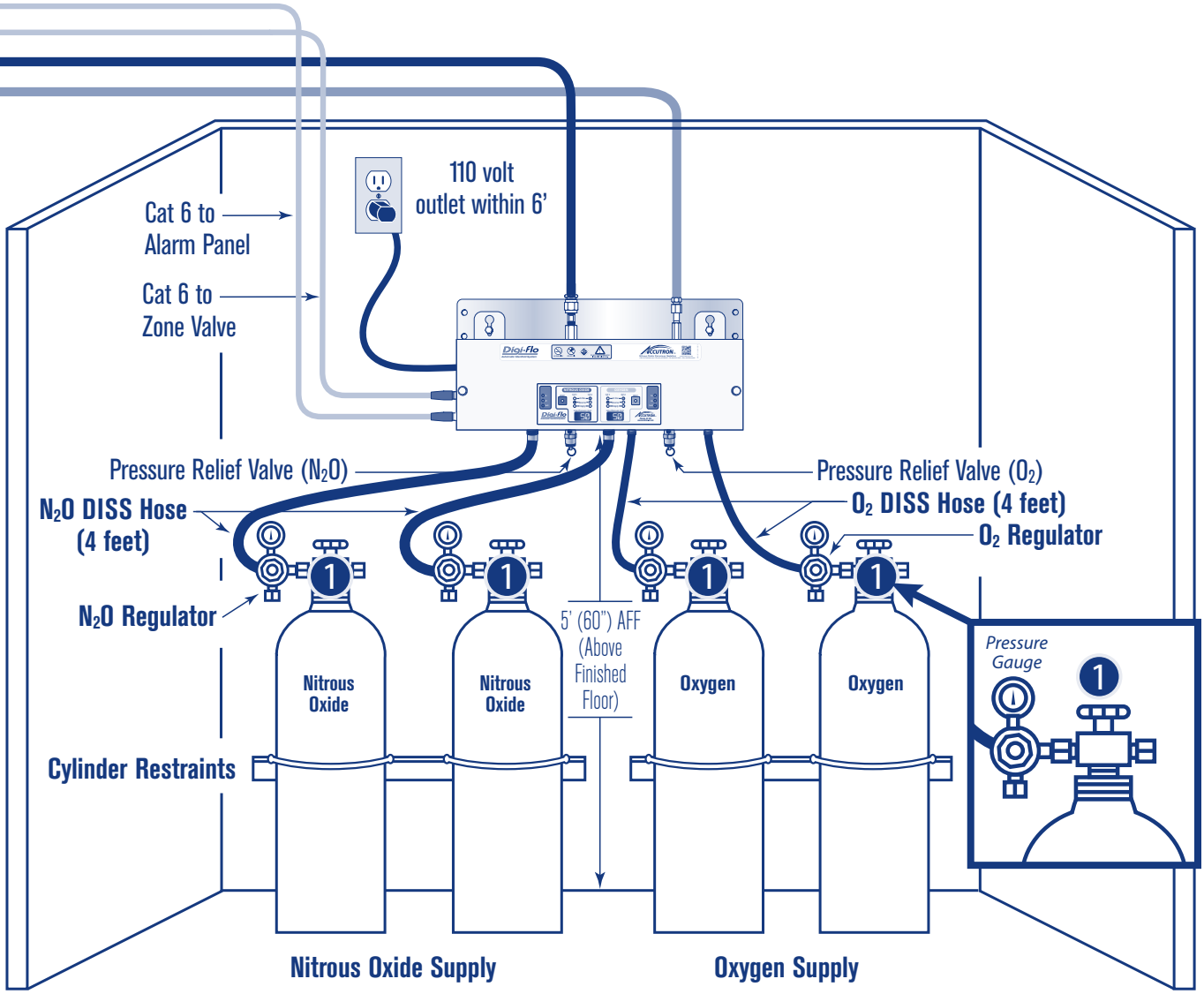
i. Open Gas Cylinders in gas storage room
ii. Press "POWER" button
iii. Security Light will flash
iv. Enter Security Code
v. System will turn on
vi. Shut down: Press Power and close cylinders

NON-SECURITY SYSTEM OPERATION:

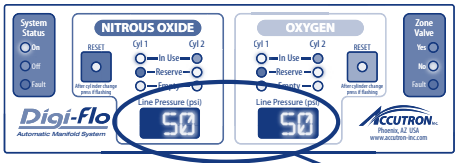
i. Open Gas Cylinders
ii. Press "POWER" button
iii. Shut down: Press Power and close cylinders

5) **TEST BUTTON:**
   - Tests all LED's
   - Must wait 50 seconds after start-up or between pressing

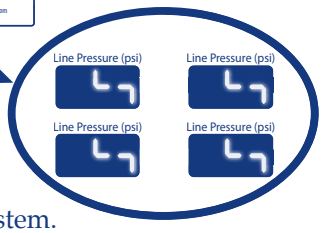
6) **MUTE BUTTON:**
   - Temporarily mutes audio alarms



AT THE MANIFOLD:



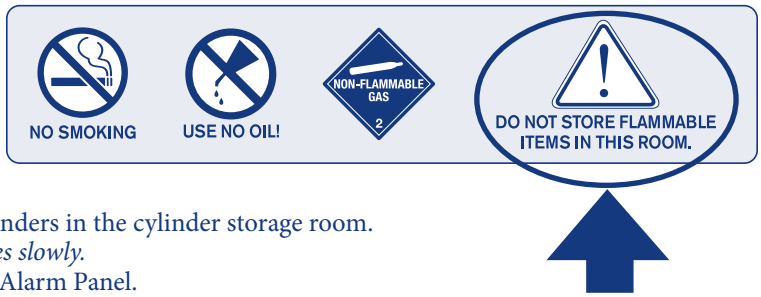
There will be no alarm or cylinder changes during this period.



- If you are near the manifold when the system turns on, the digital gauges will display a toggling up and down for 50 sec.
- This will give the system time to fill the lines and the pressure to stabilize before going into usage mode.
- The Digital Gauges should display the actual system pressure for each gas.
- The "System Status" mode should indicate "ON."
- The "Zone Valve" will indicate "Yes" or "No" depending if there is one in the system.
- The Gas Cylinder Status LED's should indicate which cylinder is "In Use" or "In Reserve."
- OR, if any of the cylinders are empty they will indicate "Empty."
  - At which time the staff should order replacement cylinder(s).
  - The "Empty" indicator will also illuminate on the Alarm Panel in the office, reminding the staff to order a replacement cylinder(s).
- Any other questions? Please refer to the Troubleshooting Guide in this manual.

II. CYLINDER ROOM INSTRUCTIONS

PLEASE FOLLOW ALL CYLINDER ROOM INSTRUCTIONS



1. START OF THE DAY:

a. Open Oxygen and Nitrous Oxide Cylinders in the cylinder storage room.
Note: Open the Gas Cylinder Valves slowly.
b. Turn on the Manifold System via. the Alarm Panel.
Note: Remember to enter the security code on the security-equipped models.

2. OBSERVE DURING START-UP:

a. Office Alarm Panel:
i. Indicator light confirming system is "on."
ii. Observe that both gases indicate "Normal" during start-up for the first 50 seconds, then the real status is displayed.
Note: confirm that it is not "Low" or "High."
Note: if there are any "Empty" cylinders and if so, order replacements.
b. Manifold:
i. System status
ii. Zone Valve status. Yes, if zone valve is connected. No, if not connected.
iii. Cylinder Status: Each Cylinder should show one of these: "In Use", "In Reserve", or "Empty."
iv. Digital Display should indicate in the 50-55 psi range.

3. DURING OPERATION:

a. If an alarm sounds at the Office Control Panel:
i. Press the "Mute button to temporarily silence the alarm.
Note: If alarm is "Low" or "High," determine if O_2 or N_2O, and which cylinder is causing the alarm.
ii. Go to the Manifold Storage Room:
1. Turn off the cylinder indicated as "Low" or "High."
2. Ensure that the system switches to the reserve cylinder.
Note: Gas must be flowing at a flowmeter for the system pressure to go down so it can switch.
iii. If the pressure indicates "Low" or High" and the regulator pressure indicates gas in the cylinder: Call your authorized Accutron Service Provider.
iv. If the Pressure indicates "Low" and the regulator pressure indicates that there is no gas in the cylinder: Call your gas supplier for a replacement Cylinder.

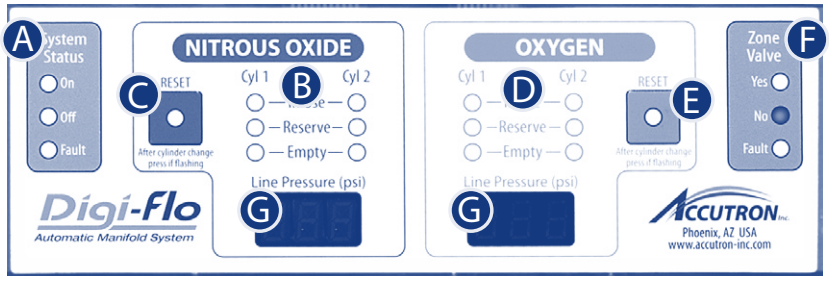
4. REPLACING CYLINDERS:

a. When replacing an empty cylinder:
i. Turn off the valve on the cylinder to be replaced, remove regulator, set cylinder out of the way.
ii. Install the new cylinder, install the regulator *(ensure it is tight)*, open the cylinder, slowly.
iii. Press the "**RESET**" button on the manifold panel to reset the system.

5. END OF THE DAY:

a. Confirm that all operatory flowmeters are off.
b. Confirm if there are any "Empty" indicators on the Office Control Panel.
Note: If so, order replacement cylinders immediately.
c. Turn off the Manifold System via. the Office Alarm Panel.
d. Close all Oxygen and Nitrous Oxide Cylinders in the cylinder storage room.

III. DIGI-FLO DISPLAY GUIDE



A. System Status
B. Nitrous Oxide Cylinder Status
C. Nitrous Oxide Cylinder Reset
D. Oxygen Cylinder Status
E. Oxygen Cylinder Reset
F. Zone Valve Status
G. Digital Pressure Displays

IV. SYSTEM OPERATING INSTRUCTIONS

ALERT

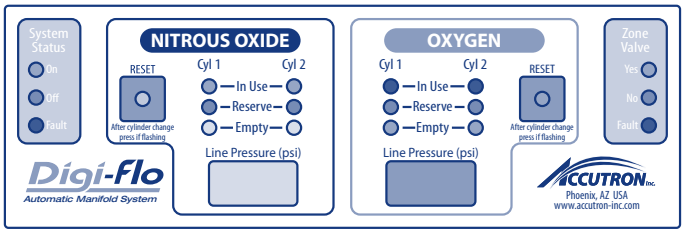
For proper system function, it is important that the steps for System Activation and System Deactivation are carried out in the order that they are listed. Please note: For emphasis, various alert messages have been provided throughout these instructions.

V. SYSTEM ACTIVATION

ALERT

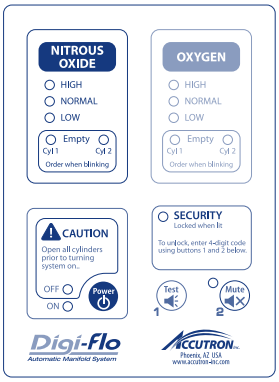
Before turning on the system, check that the power is connected by confirming that the "Off" indicator lights are illuminated on both the Alarm Panel and the Manifold.

Main Manifold Panel

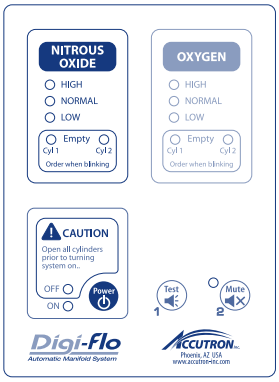


Note: When the system is activated, the Alarm Panel will indicate "On" and as long as the pressure for each gas is O.K., both gasses will indicate "Normal." "Empty" lights will flash if replacement cylinders need to be ordered.

Office Alarm Panels



Security Model



Non Security Model

TO TURN SYSTEM ON:

1. OPEN ALL CYLINDERS VALVES - Prior to activating the system, open the cylinder valves located at the top of the 2 nitrous oxide gas cylinders and the 2 oxygen gas cylinders.

   The gas cylinders are housed in the cylinder room and they are connected to the Main Manifold by regulators and low pressure hoses.

2. PRESS SYSTEM POWER BUTTON (located on the Office Alarm Panel)

   a) Security Model - When the Power button is first pressed, the red security LED will come on to show system is locked. Using the Test and Audio Cancel buttons 1 and 2, enter the factory preset 4 digit code 1-2-2-1. If correct code is entered within 5 seconds, red LED will go out and green "On" LED will turn on. If incorrect code is entered, system will go to solid red light and wait for correct code.

   * If you forget your code or need a different security code, please contact Accutron Technical Services @ 623-780-2020

   b) Non Security Model - When the Power button is first pressed, the red "OFF" LED will go out and the green "ON" LED will illuminate.

   c) Gas status lights will also indicate whether line pressures are "High," "Normal," or "Low."

ALERT

It is important to verify that the cylinders have been opened before activating the Alarm Panel. (Having the cylinders open before activating the system allows the "cylinder status" software feature to identify which nitrous oxide and oxygen cylinders were the "In-Use" cylinders and which were the "Reserve" cylinders when the system was last turned off.) This cylinder identification process provides assurance that the gases contained in the "In-Use" cylinder will be fully depleted before switching over to the "Reserve" cylinders.

VI. SYSTEM IN USE

After the system is activated, all cylinder switching, cylinder status LEDs and "High," or "low pressure alarms will be automatic.

When a gas cylinder is being switched, the *Office Alarm Panel* will beep three times and the LED for the empty cylinder will flash. At the manifold, the empty cylinder status LED will display "empty" while the "Reserve" cylinder status will display "in use." The Reset button for gas indicating "empty" will start flashing. After the gas supplier replaces the empty cylinder, opens the valve, and presses the "Reset" button for that gas, the *Alarm Panel* "Empty" LED will stop blinking. At the manifold the newly installed cylinder status LED will change to "In Reserve" and the Reset button will stop flashing.

The Digi-Flo™ Manifold/Alarm Panel system is programmed to remember the status of each cylinder. ("In Use," "Reserve," or "Empty") status of each cylinder as well as the "Empty" status on Alarm Panel. This "cylinder status" feature works when the system is on or off, and it also retains its memory if there is a power outage. In order to maintain this status, all gas cylinders must first be opened before turning on the system at the Office Alarm Panel. *(As described in the "Getting Started" section at the beginning of this manual.)*

LOW PRESSURE ALARM: If both cylinders of either gas *(Nitrous Oxide or Oxygen)* are depleted below 40 psi:

OFFICE ALARM: the respective low-pressure alarm will come on. Both "Empty" LEDs will blink, the red "low-pressure" LED will blink, and the audio alarm will beep unless silenced by pressing the mute button. LED's will continue to flash until the low-pressure condition is corrected by bringing replacement full cylinders on line, and pressing the "Reset" button.

MANIFOLD: the individual gas reading will alternate between showing the line pressure, and the word "LO."

OXYGEN FAILSAFE: The system's oxygen fail-safe feature will activate if the oxygen pressure is depleted and nitrous oxide gas will be prevented from flowing *(no matter how much nitrous oxide gas remains in the cylinders)* this condition will remain until oxygen pressure is brought back on line.

HIGH PRESSURE ALARM: If either gas system line pressure exceeds 60 psi, a high pressure condition will activate:

OFFICE ALARM: the respective "High Pressure" LED will blink, and the audio alarm will beep mute button. LED's will continue to flash until the high-pressure condition is corrected by adjusting or replacing the failed regulator.

MANIFOLD: the individual gas reading will alternate between showing the line pressure and the word "HI."

BOTH HIGH & LOW PRESSURE ALARMS: If both High & Low LED's are flashing on the Alarm Panel, there is a loss of communication to one of the alarms or zone valves, sensor errors, or switch setting errors. *Refer to Troubleshooting Guide.*

VII. SYSTEM DEACTIVATION

1. **PRESS SYSTEM POWER BUTTON:** (located on the Office Alarm Panel) - The green "ON" LED will turn off and the red "Off" LED will illuminate.
2. **CLOSE ALL CYLINDER VALVES:** After deactivating the system, close the cylinder valves located at the top of all nitrous oxide and oxygen gas cylinders.

ALERT

The NFPA code requires all cylinders to be closed when system is turned off, including times when the building is unoccupied.

VIII. CHECKING YOUR SYSTEM

Office Alarm Panel:

When the Power button on the *Office Alarm Panel* is first pushed, the following will happen:

a) Security Model - The Red security light will come on. Using the Test and Audio Cancel buttons 1 and 2, enter the 4 digit code 1-2-2-1, then the Red security light will turn off and the Green "On" LED will illuminate.
b) Non-Security Model - The "Off" LED will turn off and the "On" LED will illuminate.

IX. DEFINITIONS AND DESCRIPTIONS

Main Manifold

Located in the gas cylinder storage room is the main manifold. The main manifold directs gas from 2 oxygen gas cylinder(s) (expandable to 4) and from 2 nitrous oxide gas cylinders through separate gas lines plumbed through the zone valve (if system has a zone valve installed) and then on to the outlet stations or risers in each operatory. If system does not have a zone valve, gases are directed from the gas cylinders, through the main manifold, to the outlet stations in each location.

The main manifold contains pressure transducers that continuously monitor line pressures of each gas. Inside the manifold is a circuit board that hosts the central microprocessor of the Digi-Flo System. This central microprocessor controls the automatic cylinder switching and alarm status.

Manifold Indicators:

On the main manifold there are 6 N_2O LED Status lights and 6 O_2 LED Status lights.
On the left side of the Digi-Flo display panel are 3 System LED's that will indicate "Off," "On," or "Fault."
On the right side of the Digi-Flo display panel are 3 Zone Valve Status lights that indicate "Yes," "No," or "Fault."

Microprocessor

Once the system has been turned on, the microprocessor has a 1-minute delay. This delay allows gas lines to fill and pressure to stabilize. *(Short delays are in place for low-pressure alarms to prevent false alarms during gas flow fluctuations. These delays are necessary for proper system function and will ensure trouble-free day-to-day operation. No alarms or cylinder changes are allowed during this period.)*

When the Office Alarm Panel is turned "off" or a "no power" condition occurs, the microprocessor remembers the status of each O_2 and N_2O cylinder as "in-use," "reserve" and/or "empty." When the *Office Alarm Panel* is turned "on" or the power is restored, the system will always start where it left off when the system was turned off, provided all of the cylinders were open when the system was turned on.

Automatic Operation:

Since the Digi-Flo™ Automatic Switching Manifold/Alarm System performs operations automatically, system operators do not need to perform any function other than turning on/off the cylinders, turning on/off the Alarm control buttons, pressing reset buttons when cylinders are replaced, and visual inspections.

Power Loss:

The system is designed to open all valves when power is lost. During this time, no alarms will sound and no switching will occur, but all gases will flow allowing procedures to be completed. If gas is used during a "no-power" condition, we suggest that you close one cylinder of each gas and operate as a manual system until power is restored.

If power is restored in less than 4 seconds, the system will restart back in the same mode as before the power was lost. If power is off more than 10 seconds, it will come back in the "Off" mode and will need to be restarted at the alarm panel.

Office Alarm Panel

The office alarm panel can be either desk-mounted or wall-mounted. The desk mount office control panel is connected by cable to a permanently installed wall outlet. The desk mount unit is free-standing and can be positioned on a desk or other work surface for convenient access. The wall-mounted office control panel is permanently installed in a designated wall within the office.

The office alarm panel contains a circuit board that has microprocessors used to control the functions of the automatic cylinder switching system and the automatic alarm system. The office control panel also contains LEDs that indicate system "ON" or "OFF," "Security" (if this model has been purchased), alarm audio mute, cylinder order status and high/normal/low-pressure conditions for both nitrous oxide and oxygen banks of each gas. An audio alarm is mounted on the circuit board that signals when the system is activated (turned on), when cylinder status changes, and when high- or low- gas pressure conditions exist.

The office alarm panel circuit board is protected by a faceplate. The office Alarm panel comes in both a security and non-security version, wall and desk mount versions, and can operate with one or two alarms. If a second alarm is used, it must be ordered as a 2nd Alarm to insure it is properly configured.

The system manager can activate the gas system ON/OFF, mute and system test functions from the office control panel. Other functions are automatic and do not require any operator input, they are:

- "Empty" LED's to remind the staff to order replacement cylinders when lights are blinking. LED turns on automatically and off when the "Reset" button is pressed at the manifold.
- High and low pressure visual alarms are turned on and off automatically.
- High and low pressure audio alarms are turned on or off automatically or can be silenced with the audio mute button.

The first step before activating the system is to open the cylinder room and open all the gas cylinders. Next, turn on the office alarm panel. The Alarm Panel has a row of 3 LED's for each gas indicating High/Normal/Low, as well as "Empty" for each gas bank.

Following the operational steps in the correct order allows the Digi-Flo™ Automatic Switching Manifold/Alarm to maintain optimal cylinder management performance and ensures system compliance with NFPA 99 requirements.

In some installations, there will be two alarm panels working in parallel. Either one can be used to turn the system on or off. In these installations, either alarm can control the system but both will indicate the system status. *(Contact Accutron for information on setting up multiple alarm panels.)*

Zone Valve Notes *(Optional)*

- Fact: Just because an office is utilizing an automatic manifold, this does not mean that it is called out as a "remote location."

- Consider: A dental office with an NFPA defined gas storage room that is "remote" from the dental use points is required to have an automatic changeover manifold and a Zone Valve. In some cases multiple Zone Valves may be required.

The zone valve is typically located in an exit corridor that is easily accessible, to the staff as they leave the building, as well as to emergency personnel during a fire or other emergency. A protective plastic shield that can be easily removed during an emergency situation covers the zone valve's components. The zone valve contains 2 valves (one for oxygen and one for nitrous oxide) that can be easily closed during an emergency, isolating gas outlet stations and operatories from the gas source in the cylinder room.

The zone valve also contains digital pressure gauges powered by digital transducers that allow both visual and electrical monitoring of gas pressure downstream of the zone valve. The zone valve is connected to the "IN" at one end to the nitrous oxide and oxygen gas lines plumbed from the main manifold and from the "OUT" to outlet stations at the other side.

The zone valve pressure switches are connected via. a cable that transmits the pressure switch signals to the main manifold. The transducers automatically check pressure and transmit the information back to the main manifold and on to the office alarm panel. If zone valve pressures go low or high, the LED's will alternately flash the pressure along with "LO" or "HI." As with other subsystems in the Digi-Flo™ Automatic Switching Manifold/Alarm System, the zone valve does not need any user

input or action to perform their function. A visual check of the pressure switches should be made on a daily basis to ensure proper piping system pressure (45-55 psi). Periodic closing and reopening of the valves in the zone valve box is recommended.

In some installations, there will be multiple zone valves. Digi-Flo allows up to 4 zone valves and will indicate which zone valve is in an alarm mode at the manifold and the alarm panel. *(For information on setting up multiple zone valves, contact Accutron.) When installing multiple zone valves, contact Accutron for proper setup instructions.*

Gas Cylinders are Not included with Digi-Flo, *(purchase or rent from gas supplier)*

Medical gases (USP oxygen and USP nitrous oxide) are delivered to the office cylinder room in compressed gas cylinders by a gas supply service. The gas supplier connects the gas cylinders to the regulators. When in the cylinder room, gas cylinders must be held in place by a cylinder restraint system to prevent a cylinder from falling and causing injury or damage. In some cities, two restraints are required for each cylinder. *(Order separately from your authorized Accutron dealer.)*

When the office alarm panel indicates that a nitrous oxide or oxygen cylinder needs to be ordered, contact a gas supplier to request replacement gas cylinders. The LED will indicate "EMPTY" until the cylinder has been changed, and the "Reset" button on the manifold for that gas has been depressed.

At the time the gas supplier replaces the empty cylinder with a full cylinder and opens the valve, the cylinder management system will not recognize that the empty cylinder has been replaced and a reserve cylinder has been connected to the system UNTIL the "Reset" button has been pressed on the manifold, signaling that the "EMPTY" cylinder(s) have been replaced.

To meet NFPA 99 Fire requirements and to assure that gases do not leak from any portion of the gas delivery system, Accutron recommends that gas cylinder valves be closed when the system is not in use and the office is not open.

At the beginning of each workday **before activating the system from the office control panel**, open all gas cylinder valves.

Conversely, at the end of each workday **after deactivating the system from the office control panel**, close all gas cylinder valves.

Oxygen Fail-Safe

The oxygen fail-safe is an automatic safety feature that is built into the main manifold's microprocessor. It is activated when acceptable levels of oxygen pressure are not detected from either oxygen bank #1 or oxygen bank #2, and it automatically stops the flow of nitrous oxide until oxygen pressure is restored to normal levels. Acceptable levels of gas pressure are in the range of 45-55 psi.

Pressure Regulator

Attached to each gas cylinder, pressure regulators reduce the high pressure in the cylinder to 50-55 psig, the operating pressure of the gas delivery. The gas fittings on the regulators meet CGA specifications. Note: The output at the regulators will vary 3-6 psi as the pressure in the cylinder changes during use. *(Pressure regulators perform their function automatically and require no user operation.)*

> ***Note: In order to operate and function properly, the temperature in the manifold system's environment needs to fall within the following ranges: 19 to 130 F; -7 to 54 C. These ranges are based on NFPA 99 specifications. Environments at low end of temperature range may require a heating device on regulators or cylinders according to manufacturer's recommendations.***

Outlets, Outlet Stations, and Risers *(Not included – order separately)*

Usually located in an operatory, outlet stations can be flush-mounted in the wall or surface-mounted on the wall. Outlets allow gas from the plumbed gas lines to be transferred via gas-specific QD or DISS hoses to a nitrous oxide-oxygen conscious sedation flowmeter for delivery to a patient.

Accutron's push button outlets allow quick connecting and disconnecting of the hoses running to the flowmeter. Disconnecting the hoses at the outlet station when not in use prevents loss of gases due to gas seepage in the outlet station hoses or in the flowmeter.

NFPA 99

National Fire Protection Association Standard for Health Care Facilities addresses: building requirements based on levels of sedation delivery to patients, fire, and electrical hazards in health care facilities through performance, maintenance, testing and safety practices for both the facilities and the material, equipment and appliances they contain.

The installation of the gas storage must be in accordance with the National Fire Protection Association Standards and inspected by the local 3rd Party Verifiers and building departments to assure compliance with the NFPA and local codes.

The installation of medical gas piping must be by certified Medical Gas plumbers.

CGA: Compressed Gas Association, who sets the standards for gas connections and approved gas delivery piping.

DISS: Diameter Index Safety System. Gas specific connections that prevent crossing over gasses.

All information provided is intended to assist in the installation of the medical gas system. It is not intended to be complete or eliminate the need to reference NFPA 99 regulations.

MED GAS STORAGE ROOM CAUTION:

A) This room is to only contain items directly med gas related.
B) Under no circumstances is storage of either:
   1) anything flammable, or
   2) anything non-med-gas-related
      inside the gas storage room.

ALERT
INSTALLERS AND STAFF

X. TROUBLESHOOTING GUIDE

NO LIGHTS ON MANIFOLD
- Check that wall outlet has power.
- Check fuses located in entry module behind cord.
- Check circuit board fuse located on the top right front of the board.

MANIFOLD SHOWS RESERVE GAS BUT CYLINDER IS ACTUALLY EMPTY
- RESET button was pushed by mistake. In the future, only press RESET when new gas cylinder is installed.
- Recovery can be achieved by pressing the "STATE" button on the circuit board (under the cover).
- Press STATE as needed until the proper sequence is shown."

MANIFOLD AND ALARM PANEL BOTH SHOW EMPTY WHEN IT IS ACTUALLY FULL
- RESET button was not pushed when cylinder was replaced. Push RESET button for that gas and Cylinder will change to reserve status.

MANIFOLD STATUS SHOWS THE SYSTEM IS ON BUT NO GAS IS FLOWING
- Solenoid wires might be crossed. Verify left cylinder (#1) is plugged into left socket and right cylinder (#2) is plugged into the right socket.
- Solenoid might be stuck closed. Pull solenoid cable out of the circuit board. Solenoid should open.

ZONE VALVE "FAULT" LIT ON MANIFOLD
- Communication broken between the zone valve and the manifold.
- Manifold board set to incorrect number at zone values. (see DIP switch settings for multiple zone valves)

SYSTEM STATUS "FAULT" LIT ON MANIFOLD
- Communication lost with one or more alarm panels.

LOW PRESSURE ALARMS COME ON SHORTLY AFTER SYSTEM TURNED ON
- Massive leak in large volume system lines. The delay in alarms during startup is not long enough to fill the medical gas lines.
- Check manifold pressure before startup for low pressure. Fix any leaks. Make sure all flowmeters are tuned off.
- RESETs will need to be processed for low gases.

HIGH PRESSURE ALARM SOUNDS
- Faulty regulator or regulator set too high. Adjust regulator pressure down to 50 psi and watch for rise in pressure. Should not rise during 3-minute observation time.

XI. ERROR CODES

C1	Com lost with 1 alarm panel	**E1**	Com lost w/ ZV 1, or does not match dip setting
C2	Com lost with 2 alarm panels	**E2**	Com lost w/ ZV 2, or does not match dip setting
C3	One too many alarms detected	**E3**	Com lost w/ ZV 3, or does not match dip setting
		E4	Com lost w/ ZV 4, or does not match dip setting
D1	Sensor lost on zone valve 1	**E5-EF**	Multiple Zone Failures*
D2	Sensor lost on zone valve 2		
D3	Sensor lost on zone valve 3	**FO**	Sensor failed open (could mean unplugged cable)
D4	Sensor lost on zone valve 4	**FS**	Sensor shorted closed (could mean damaged sensor)
D5-DF	Multiple Sensors Failures*		

DF Flashes when regulator setting mode is in use.
Flashing vertical bars on manifold pressure settings – flashes for about a minute when system turned on to indicate safety period. This period allows for system lines to stabilize. During safety period, gas will flow but no alarms, cylinder changes, or RESETs are allowed.

* For other codes starting with D or E, contact Accutron.

XII. WARRANTY

ACCUTRON 1-YEAR MANIFOLD LIMITED WARRANTY

IF AN ACCUTRON MANIFOLD NEEDS TO HAVE REPAIR WORK OR REPLACEMENT PARTS DURING THE 1-YEAR WARRANTY PERIOD DUE TO MANUFACTURING DEFECTS, ACCUTRON WILL PROVIDE THE PARTS AND LABOR AT NO CHARGE. THE MANIFOLD OWNER IS RESPONSIBLE ONLY FOR A $35.OO SHIPPING AND HANDLING FEE, WHICH WILL BE ASSESSED EACH TIME A MANIFOLD IS RETURNED TO ACCUTRON FOR WARRANTY WORK.

WARRANTY TERMS

Limited Warranty and Disclaimer: Accutron ("Seller") warrants that its product will be free from manufacturing defects subject to the terms, conditions, and limitation set forth hereinafter, for a period of 1 year for manifolds and 1 year for other equipment products. Seller's obligations under this limited warranty are contingent on Buyer's full payment of the product purchase price. Except as specifically set forth above, Seller and its affiliates make no warranties, expressed or implied, and specifically disclaim any warranties of merchantability or fitness for a particular purpose.

The liability of Seller and its affiliates for any claims, losses, damages, or expenses from any cause whatsoever (including acts or omissions of third parties) regardless of the form of the action, whether in tort, contract, or otherwise, shall not exceed the repair cost, replacement cost, or purchase price of the product that directly gives rise to the claim. Seller and its affiliates shall not be liable for any incidental, special, reliance, consequential, or indirect loss or damage rising out of this agreement or the products. As used in this paragraph, consequential damages include, but are not limited to, lost profits, lost revenues, property damage, personal injury damage to the Purchaser or third parties, loss of business or profits, and/or loss of business reputation. It is the sole responsibility of Purchaser to determine the suitability of the products for the Purchaser's intended use. Seller's obligation to repair, replace or refund, as set forth above shall be Buyer's exclusive remedy.

This warranty constitutes the entire warranty. This warranty and Seller's liability hereunder shall be construed according to the laws of the State of Arizona without regard to conflict of lay principles. To activate the Manifold Warranty, complete and mail the warranty registration card that accompanies Manifold.

Accutron warranties are subject to the following conditions: Accutron products and equipment are warranted to be free from defects in material and workmanship under normal use and service, including all component parts. This warranty shall not apply to defects resulting from accidents, alterations, or misuse. If modifications have affected the operation of the product to render it faulty, this warranty shall be void.

This warranty shall be void if any part not of Accutron's manufacture or supply has been incorporated into the product.

THIS WARRANTY IS GIVEN IN PLACE OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OTHERWISE.

No statement or claim about the product by any employee, agent, representative or dealer of Accutron, Inc. shall constitute a warranty by Accutron, Inc. or give rise to any liability or obligation of Accutron, Inc.

XIII. WARRANTY AND RETURNED GOODS POLICY

All warranty resolution issues and merchandize returns will be handled through the local authorized Accutron distributor. Contact distributor where unit was purchased.

XIV. REPAIR SERVICE POLICY

All service issues will be handled through the local authorized Accutron distributor. Contact distributor where unit was purchased. *See Checking Your System* on page 9 prior to contacting distributor.

XV. ASSISTANCE

For Assistance, contact your local dental distributor or call Accutron Customer Service at:

Toll-free: (800) 531-2221
Local: (623) 780-2020
Fax: (623) 780-0444

Hours of operation: 7:00 AM – 4:30 PM MST

Service ship-to address:

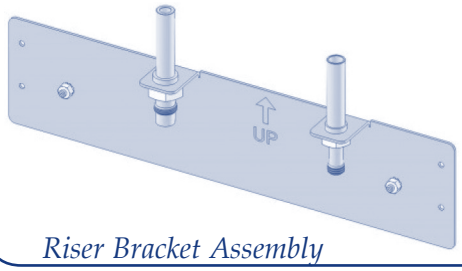
Accutron, Inc.
1733 W. Parkside Lane
Phoenix, AZ 85027

Visit our website:

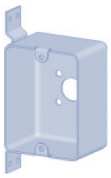
www.accutron-inc.com

XVI. PRE-INSTALL INSTRUCTIONS

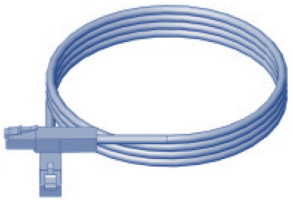
49051 – PRE-INSTALL KIT FOR PKG A & C (DESK MOUNT ALARMS)



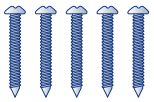
Riser Bracket Assembly



Single Gang Switch Box 2″x 4″

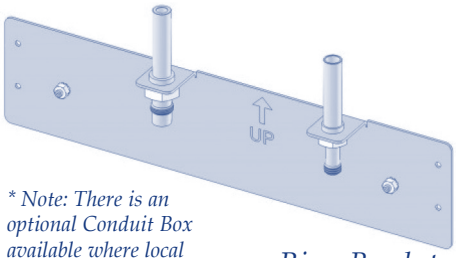


100′ Cat 6 Cable Grey, Shielded



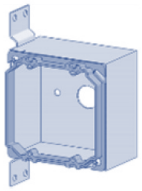
Mounting Screws

49052 – PRE-INSTALL KIT FOR PKG B & D (WALL MOUNT ALARMS)

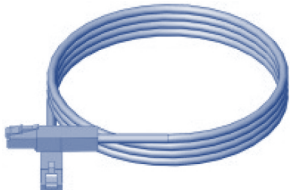


** Note: There is an optional Conduit Box available where local codes require electrical conduit/box connections.*

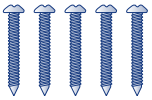
Riser Bracket Assembly



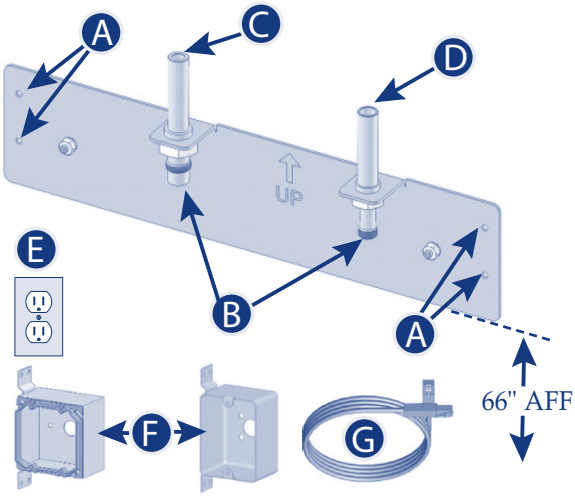
Two Gang Switch Box 4"x4"



100′ Cat 6 Cable Grey, Shielded



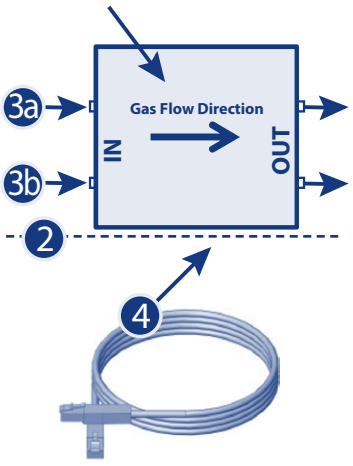
Mounting Screws



A. Mount Riser Bracket Assembly to studs, 16" on center, 66" AFF.
B. Connect nitrogen purge to the O_2 & N_2O DISS fittings.
C. ** Braze with either 3/8" or 5/8" OD Nitrous Oxide pipe.
D. ** Braze with either 1/2" or 5/8" OD Oxygen pipe.
E. Specify 110 v outlet over 5′ AFF, within 6 feet of the Riser Bracket Assembly.
F. Mount alarm panel rough-in box on a wall inside the office, locate (for a wall alarm, in a central location near the use points, in an egress corridor.) OR (for a desk alarm, on a wall above or below the desk height, near the area where the alarm will set).
G. Run the Cat 6 cable between the alarm rough-in box and the left side of the riser bracket assembly.

** ***Note: Pipe sizing and runs to be determined by others, depending on usage and pipe length.***

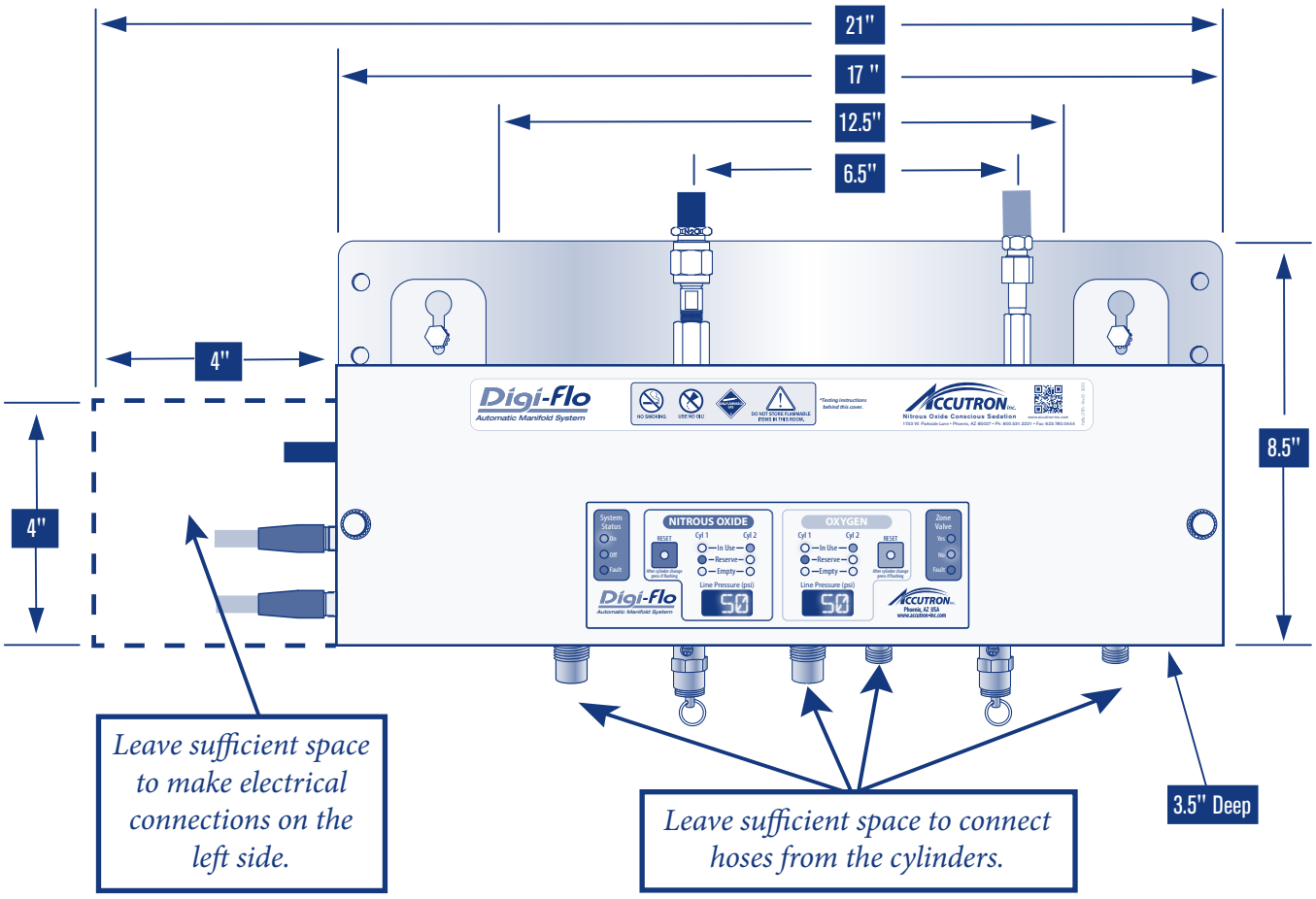
ZONE VALVE



1) Mount Zone Valve in an exit-able corridor per NFPA standards.
2) Mount Zone Valve at or above 60″ AFF, secure to studs.
3) Braze pipes in and out of Zone valve following NFPA standards. *(Use care to **KEEP THE INTERNAL PIECES COOL** during brazing, see note #I)*
   a) Oxygen on top
   b) Nitrous Oxide on the bottom
4) Run the Cat 6 cable between the left side of the manifold riser bracket assembly & the hole in the bottom center of the Zone Valve box and the. Leave approx. 12″ of cable in the box. *(If there are multiple Zone Valves, run the cables in series between them. Digi-Flo allows up to 4 Zone Valves to be installed.) (Set up instructions for multiple Zone Valves are available from Accutron Customer Service.)*

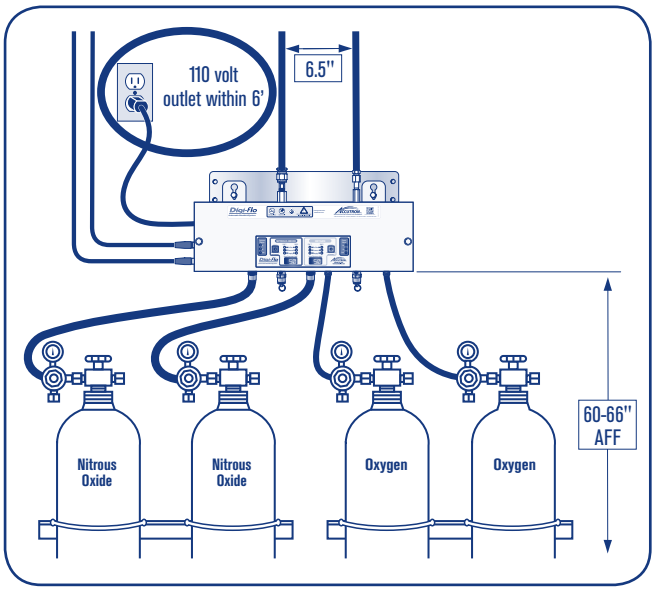
INSTALLATION NOTES:

I. We advise the use of Cool Gel, Thermo Trap, or similar products to protect fittings & valves during the brazing process.
II. There is an optional Conduit Box available where local codes require electrical conduit/box connections. Must be ordered separately.
III. NFPA Allows up to 2 Alarm Panels on one manifold system. Contact customer service for details.
IV. NFPA allows multiple Zone Valves on one manifold system. Contact customer service for details.

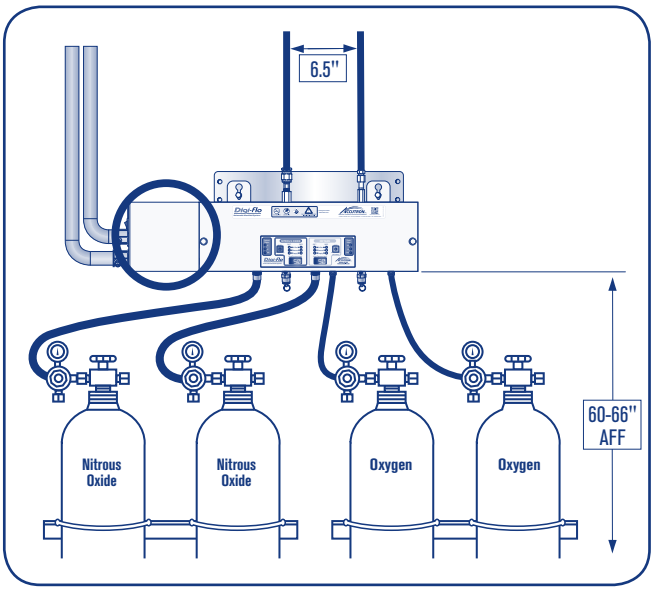


SELET POWER CONNECTION:

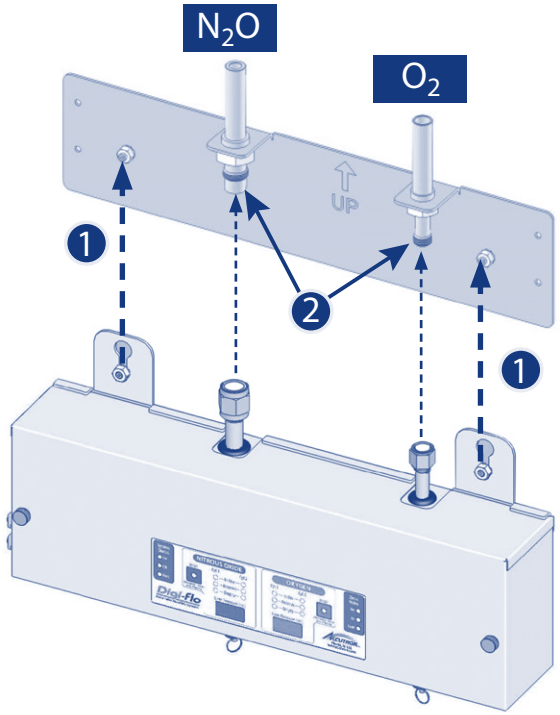
a) 110v Outlet for flexible wire connections



b) Optional 4 x 4 Conduit Adapter Kit.
p/n: 27985-FRU *(See install instructions on page 20)*

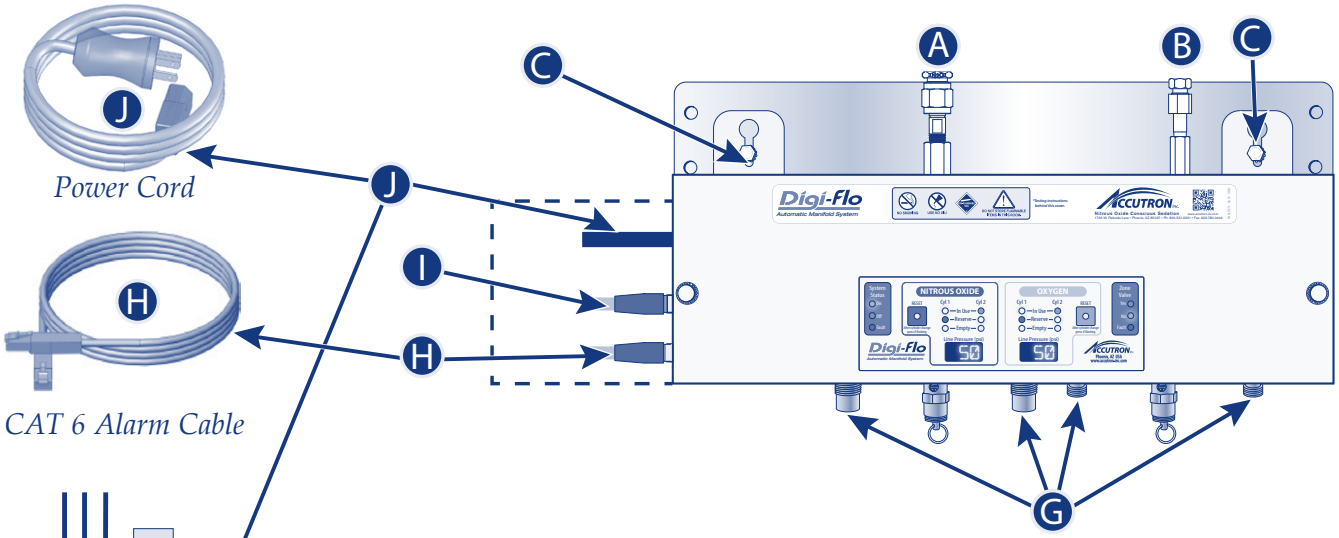


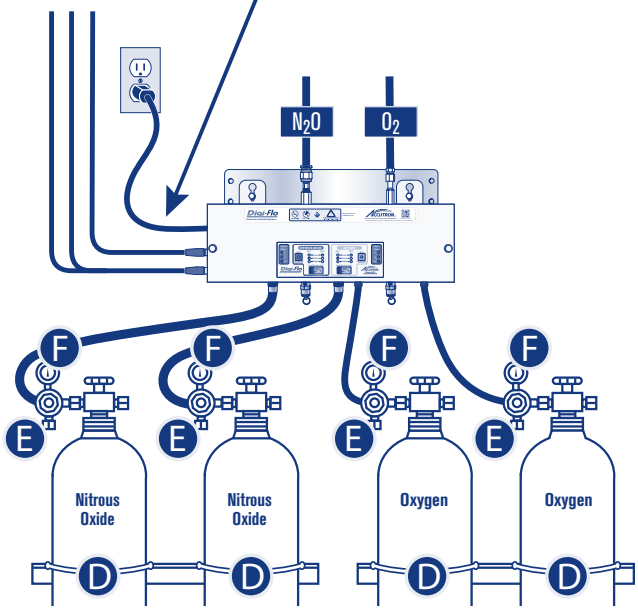
XVII. FINISH INSTALL INSTRUCTIONS



MANIFOLD N_2O AND O_2 CONNECTIONS

1) Loosen the two nuts, and slide Digi-Flo manifold onto two studs of the Riser Bracket Assembly
2) Hand tighten the "A" N_2O DISS nut onto the riser, then the "B" O_2 nut onto the riser
3) Tighten down both N_2O and O_2 nuts with wrench
4) Tighten down the two "C" nuts to hold the Digi-Flo in place
5) Secure Cylinders to the wall w/ Restraints "D"
6) Connect 2 - N_2O & 2 - O_2 regulators "E", and hoses "F" onto the cylinders
7) *(Blow some gas through each hose to clear any potential debris before connecting)*
8) "G" Connect 2 - N_2O & 2 - O_2 hoses to the Digi-Flo, tighten with wrench



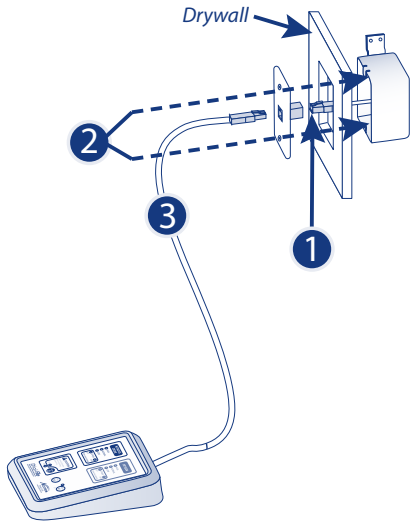


MANIFOLD CAT 6 AND POWER CONNECTIONS

9) Install Alarm Panel (see page 19)
10) * Plug the Cat 6 alarm cable "H" into Digi-Flo
11) If zone valve(s) installed, remove dongle plug "I" and connect cable to Digi-Flo. (if there is not a Zone Valve, the dongle plug must be in the manifold socket or it will go into "Fault" mode. See page 19 for Alarm Install Instructions.)
12) Plug in power cord to Digi-Flo and the wall outlet "J"
13) If required by local codes, there is an optional Conduit Box available that fastens to the Digi-Flo and covers the electrical connections. (See "K")

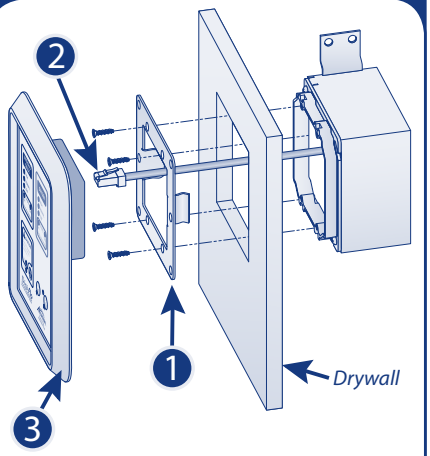
** NOTE: The system will recognize the devices EG Alarm, Zone Valve*

DESK ALARM KIT



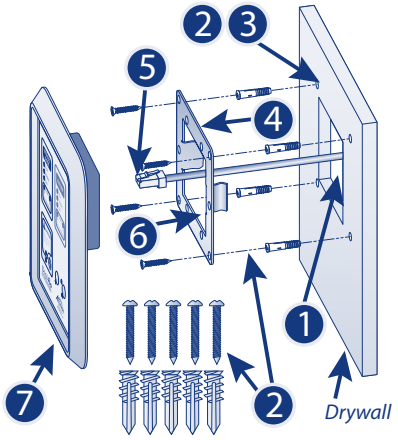
1) Plug the Cat 6 cable from the Manifold into the back of the cover plate
2) Mount the cover plate to the 2 gang switch box in the wall
3) Plug in the short Cat 6 cable into the wall plate, locate the Alarm Panel on a desk or shelf

WALL ALARM KIT, V1



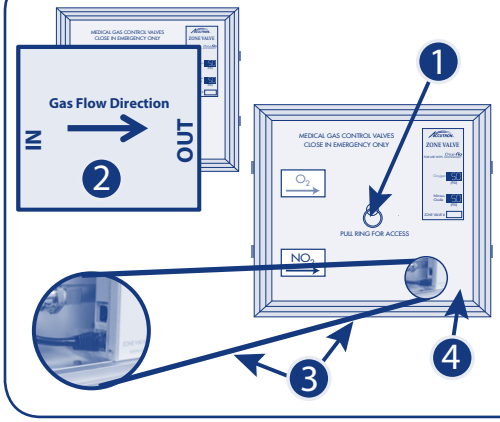
1) Mount the alarm mounting plate with the 4 screws, to the 2 gang switch box in the wall
2) Plug the Cat 6 cable from the Manifold into the back of the Alarm Panel
3) Slide the Alarm Panel into the mounting plate till flush with the wall
4) To remove alarm from bracket, insert a flat blade screwdriver into slots in the bottom of the alarm and pry it out

WALL ALARM KIT, V2



1) Cut out a hole in the drywall 3" X 3"
2) Align the alarm mounting plate over the hole and mark the 4 anchor positions
3) Drill and place the anchors in the wall
4) Mount the alarm mounting plate with the 4 screws to the anchors
5) Plug the Cat 6 cable from the Manifold into the back of the Alarm Panel
6) Slide the Alarm Panel into the mounting plate till flush with the wall
7) To remove alarm from bracket, insert a flat blade screwdriver into slots in the bottom of the alarm and pry it out

* NOTE: When two alarm panels are needed with the Digi-Flo, please contact Accutron customer service for instructions.

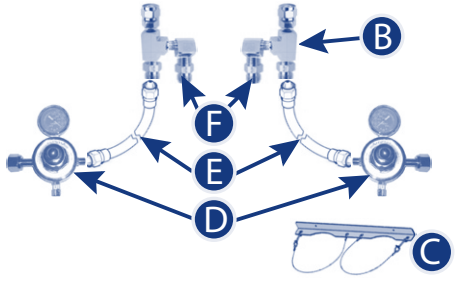


ZONE VALVE INSTALL INSTRUCTIONS

1) The Digi-Flo Zone Valve allows the high-pressure test without blocking off or removing parts
2) Remove the cardboard install protection guard "A"
3) Plug in the Cat 6 cable to the Zone Valve circuit board
   (The cable should have already been run during the rough-in stage)
   (If there is more than one zone valve on the system, see note below)
4) Install the trim plate
5) Install the removable access panel

NOTES:

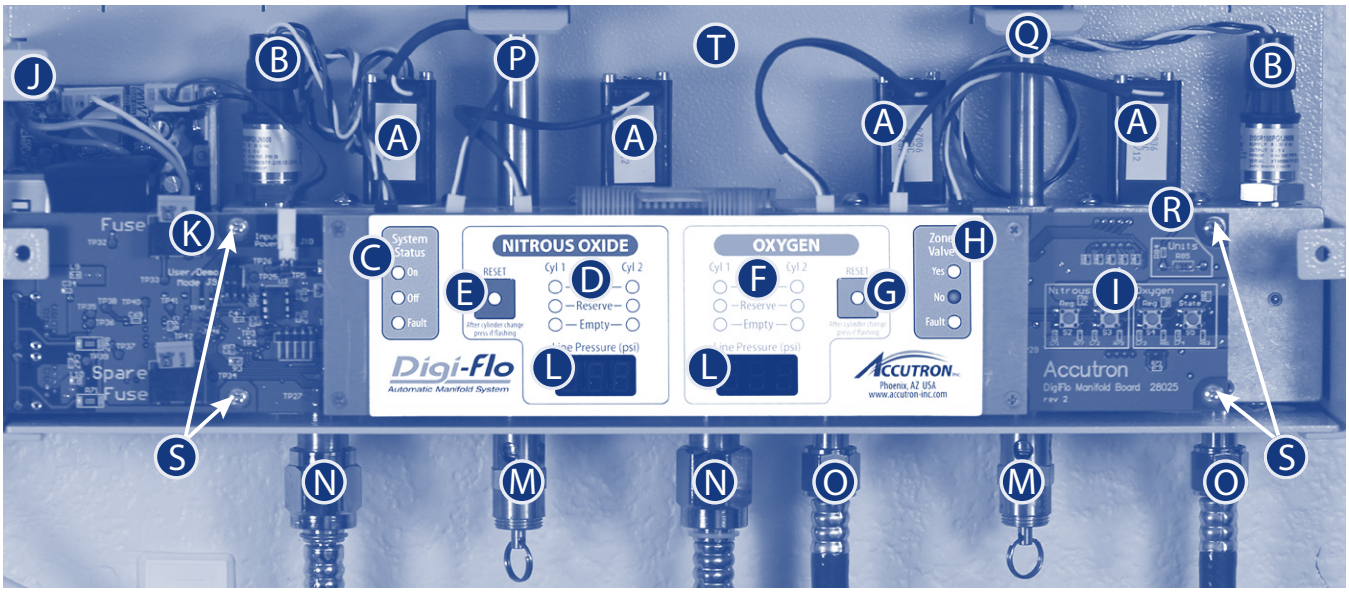
- *When 2-4 Zone Valves are needed with the Digi-Flo, please contact Accutron customer service for instructions. (Zone Valve DIP switch settings shown on pg. 21)*
- *At the manifold, remove dongle plug and connect the zone valve cable to Digi-Flo.*



ADD-ON OXYGEN REGULATOR KIT - KIT P/N 28191-FRU

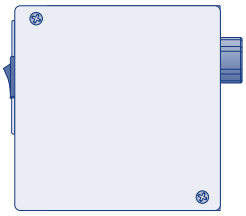
A) Unthread existing 2 Hoses from Manifold
   (Oxygen Hose p/n: 25412, N_2O hose p/n: 22732)
B) Thread on the 2 Oxygen Splitter Assemblies
C) Attach Cylinder restraints to the wall, secure cylinders
D) Connect the new regulators to the 2 new cylinders
E) Thread the Oxygen hoses onto the regulators
F) Thread the 2 existing Oxygen hoses onto the splitters
G) Open all 4 Oxygen cylinders
   (the system will use from both cylinders on each bank at the same time)

XVII. COMPONENT GUIDE

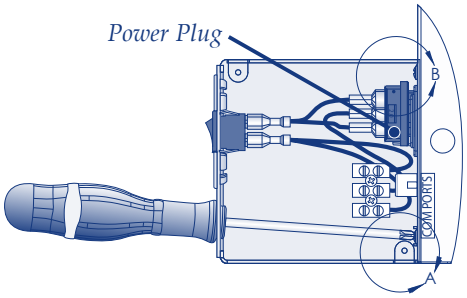


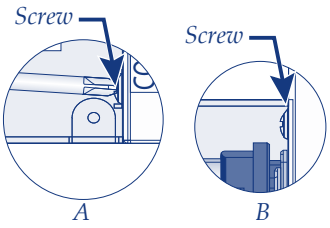
A. Solenoid Valves
B. Pressure Sensors
C. Alarm Status
D. Nitrous Oxide Cylinder Status
E. Nitrous Oxide Cylinder Reset
F. Oxygen Cylinder Status
G. Oxygen Cylinder Reset
H. Zone Valve Status
I. User Buttons
J. Power Module
K. Fuse & Spare Fuse
p/n: 28133 (Mini Blade 2 amp)
L. Digital Pressure Displays
M. Pressure Relief Valves
N. DISS N_2O Inlets
O. DISS O_2 Inlets
P. DISS N_2O Outlet
Q. DISS O_2 Outlet
R. DIP Switches
(behind circuit board)
S. Circuit Board Screws (4)
T. Manifold Rough-in Plate

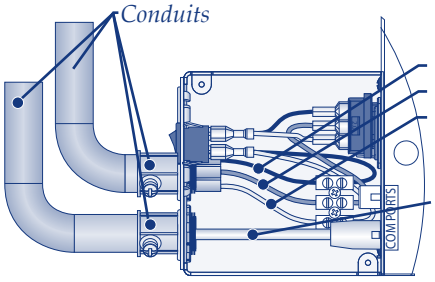
CONDUIT ADAPTER KIT INSTALLATION



1. Unthread two screws, remove cover and take bag with two screws out.

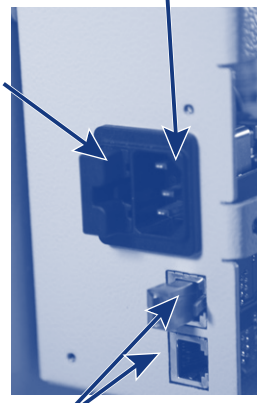






2. Place one screw from bag thru the bottom hole on the side of box and hold it in place with Phillips screwdriver placed thru the hole on the box.
3. While holding screw in place, line it up with the threaded hole on manifold and tighten slightly.
4. Line the upper hole on the side of box with the upper hole on manifold and install second screw.
5. Tighten both screws and plug power plug into power receptacle on manifold.
6. Remove middle knock-out cover, install conduits and run power cable and CAT 6 cable from alarm panel into conduit box.
7. Connect power wires to the terminal block as shown.
8. Plug CAT 6 cable from alarm panel into free COM port on manifold. Do not remove blank plug from other COM port unless zone valve is installed.
9. If zone valve is installed, remove top knock-out cover, install conduit and run CAT 6 cable from zone valve into conduit box.
10. Remove blank plug from COM port and plug CAT 6 cable from zone valve.
11. Install cover back to the conduit box.

MANIFOLD STANDARD CONNECTIONS


Power Cord Plug-in
Power Fuse Module (Holds 2 Fuses) (0.5 a, 250v, 5mm x 20mm Slow Blow) Accutron p/n 26456-FRU
Circuit Board Fuse: p/n: 28133 (Mini Blade 2 amp)
Alarm / Zone Valve Connections

MANIFOLD USER BUTTONS

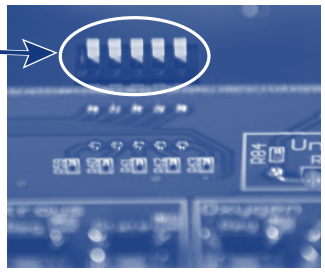
Reg = *Set Regulator Mode*
- **This is only active when the system is "Off"**
- **Depressing this button opens both cylinders, allowing the technician to set each regulator, one at a time**

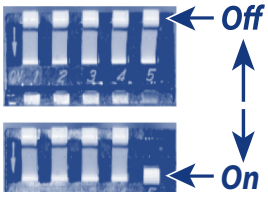
State = *Change State of Cylinders*
- **This is only active when the system is "On"**
- **Depressing this button changes the cylinder status. Repeat pressing the "State" and "Reset" buttons until the desired order is achieved.**

MANIFOLD DIP SWITCH SETTINGS *(DIP SWITCHES BEHIND CIRCUIT BOARD, ON RIGHT SIDE)*

Numbered 1 through 5 starting from left.

All Off = (Flipped back) = Factory Settings



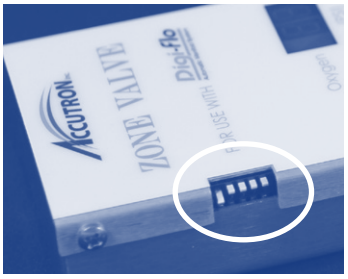


 # 1 Alarm Panel Quantity:
Off = System has 1 Alarm Panel
On = System has a 2nd Alarm Panel

 # 2, 3, 4 = Zone Valve Quantity:
1 Zone Valve = 2 Off, 3 Off, 4 Off, & remove plug from manifold
2 Zone Valves = 2 On, 3 Off, 4 Off
3 Zone Valves = 2 On, 3 On, 4 Off
4 Zone Valves = 2 On, 3 On, 4 On

 # 5 On = Code Reset
a) Turn off System at the Alarm Panel
b) On the Manifold Circuit Board, Flip #5 "On"
c) Reset the code on the alarm, by pressing #1 & 2 for a total of 4 digits
d) Flip #5 back to lock in new code

ZONE VALVE SWITCH SETTINGS



A. Zone Valve 1
- **Switch #1 On**
- **2, 3, 4, 5 Off**

B. Zone Valve 2
- **Switch #2 On**
- **1, 3, 4, 5 Off**

C. Zone Valve 3
- **Switch #3 On**
- **1, 2, 4, 5 Off**

D. Zone Valve 4
- **Switch #4 On**
- **1, 2, 3, 5 Off**

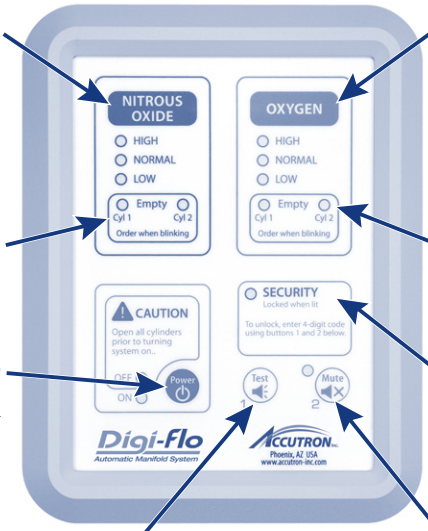
Zone Valve FUSE: p/n 28132-FRU, Mini-Blade, 1 amp (located under the cover, spare located below it)

ALARM PANEL: CONTROLS AND SETTINGS

Nitrous Oxide Notifications
- **High**
- **Normal**
- **Low**

N_2O Empty Cyl. Indicators

Power Button



Oxygen Notifications
- **High**
- **Normal**
- **Low**

O_2 Empty Cyl. Indicators

Security Access Control

System Operation - *Security*
1. Open Gas Cylinders in gas storage room
2. Press "ON" button
3. Security Light will flash
4. Enter Security Code
5. System will turn on
6. Shut down in reverse order

System Operation - *Non-Security*
1. Open Gas Cylinders
2. Press "ON" button
3. Shut down system in reverse order

1 TEST BUTTON:
- Tests all LED's
- Must wait 50 seconds after start-up or between pressing

2 MUTE BUTTON:
- Temporarily mutes audio alarms

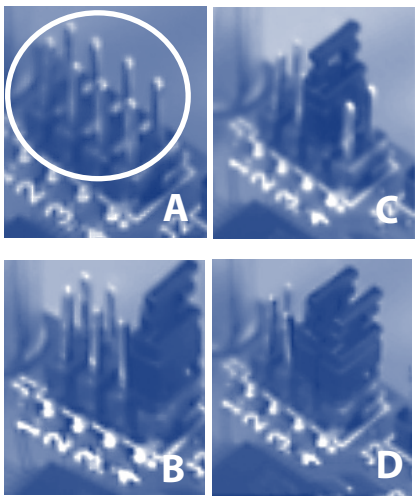
ALARM PANEL: JUMPER SETTINGS ON THE INSIDE BACK

A. No Jumpers:
- Primary Alarm Panel
- No Security

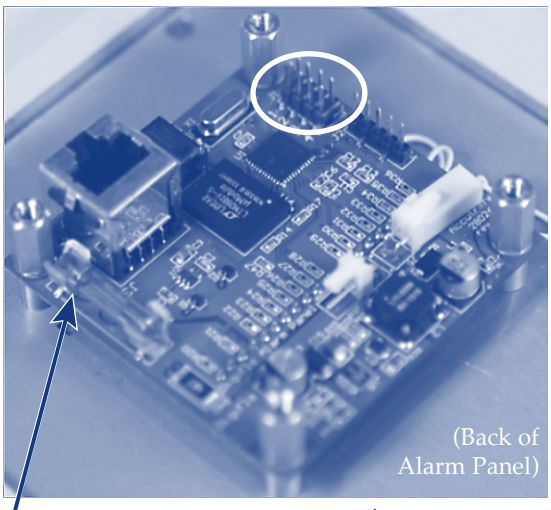
B. Jumper on #4:
- Primary Alarm Panel
- Security

C. Jumper on #3:
- Secondary Alarm Panel
- No Security

D. Jumpers on #3 # 4
- Secondary Alarm Panel
- Security



(NOTE: Terminals #1 or #2 are for Jumper Storage Only)

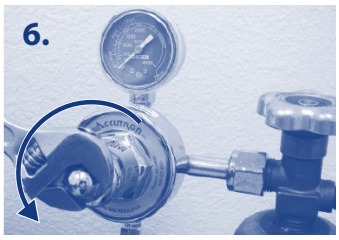


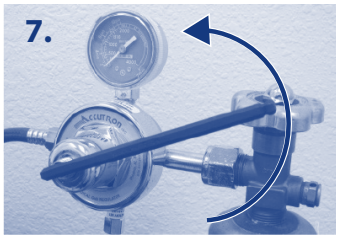
ALARM PANEL FUSE: p/n 25942-FRU
Little Fuse: 233001, 5mm x 20mm glass case, Rating: 125 Vac, 1 Amp

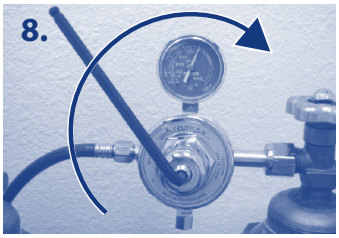
Contact Accutron Engineering before opening alarm panels.

REGULATOR ADJUSTMENT AND SETTINGS:

1. Turn off the system at the Alarm Panel inside the office
2. Cause gas to flow through the system by either:
   - Loosening the DISS fittings above the manifold to a very slight hiss, allowing pressure to bleed slightly
   - Or, turn on a flowmeter in an operatory at 5 lpm for O_2 & N_2O
3. Make sure that the cylinders are connected to the manifold in the same order that they are arranged on the floor
4. Turn on one cylinder of each gas
5. Press the "REG" button on the gas you are setting (see page 21)
   Display will flash "DF" to indicate "REG" mode
6. Adjust the open regulator
   - Start by removing the small chrome acorn nut at the very tip of the cone
   - (It doesn't matter which cylinder you start with as long as you do all of them)
   - (Sometimes the nut sticks to the stud and the whole stud comes out - don't panic, just remove nut and rethread the stud back into the regulators)
7. Using an Allen wrench, turn the adjustment stud counterclockwise to reduce pressure from the regulator
   - (this is done to make sure the regulator starts out low since it is much more accurate to slowly adjust the pressure upward than adjusting it downward)
8. Slowly turn the regulator adjustment screw clockwise, monitoring the manifold Digital Pressure indicator
   - If the pressure is too high, it will be necessary to vent excess pressure as you try to dial the regulators down low before starting to adjust (see next step)
9. Continue turning up pressure until the display reads approx 50psi
   - If you go too far - DO NOT JUST TURN IT BACK DOWN
   - return and repeat steps 6-9
10. This regulator is now set. Replace acorn nut
11. Continue on to the next regulator, and repeat steps 6-10
12. Press "REG" to exit setting mode - display will stop flashing "DF"
13. Move on to the next gas and follow steps 5-12
14. Open all 4 cylinders of gas
15. Each Gas should have one cylinder indicating "In Use" and the other "Reserve"
16. Return to the office and turn the flowmeter off
17. Turn the system to "ON" at the Alarm Panel







XIX. VERIFIER INSTRUCTIONS

1. The Digi-Flo Manifold System by Accutron Inc. is designed to follow the NFPA Cat. 3 Standard.
2. When testing the system, we recommend that you test the regulators in this order:
   a) Test the Oxygen High Pressure
   b) Test the Nitrous High Pressure
   c) Test the Nitrous Low Pressure
   d) Test the Oxygen Low Pressure
3. Lastly, set the regulators each at 50 psi

NOTES:

Alarms cannot be tested until 1-minute equalization period has ended. (see page 5)

The digital pressure display is set to time average, resulting in slow movements of the pressure display. Make gradual final pressure adjustments.

It is important to always adjust the final setting while increasing pressure, not while decreasing pressure. If you exceed the proper setting, please bleed off gas pressure, lower the regulator pressure to approx. 45 psi, and then adjust up to 50 psi.

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